FINAL DRAFT

WATER QUALITY IMPROVEMENT STRATEGIES FOR THE EVERGLADES

ALTERNATIVE COMBINATIONS FOR THE L-28 BASIN

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INTRODUCTION

The L-28 Basin has an area of approximately 133 square miles and portions are located in Broward, Hendry and Collier Counties. A map of the L-28 Basin is presented in *Figure 1*. Outlet canals for the basin are aligned north to south along its eastern boundary adjacent to Water Conservation Area (WCA) 3A and provide flood protection and drainage in addition to conveying excess runoff to WCA 3A for water supply and environmental uses. The L-28 Interceptor Canal, aligned southeast to northwest, conveys discharges from the S-190 structure to the WCA 3A and is separated from the L-28 Basin by a levee. Along the eastern border, the L-28 Borrow Canal is approximately ten miles in length. The primary discharge structure in this basin is pump station S-140, which includes a gated spillway that controls flows that may bypass the pump. Water quality monitoring at S-140 has been ongoing since 1978.

Two of the largest landowners within this basin are the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida.

CENTRAL AND SOUTH FLORIDA RESTORATION CRITICAL PROJECTS:

The Seminole Tribe Big Cypress Reservation Water Conservation Plan (WCP) is within the 52,000 acre Big Cypress Seminole Indian Reservation which lies directly north of the Big Cypress National Preserve and west of the Water Conservation Area 3A. Due to its location, the WCP is considered an integral component in the south Florida restoration program and is designed in two phases. Both phases are funded in part by the USACOE as the largest of the Federal Critical Restoration Projects and authorized by Section 528 of the Water Resources Development Act (WRDA) of 1996.

Phase I is the construction of the East Main Conveyance on the eastside of the Seminole Reservation and is scheduled for completion by January 2003. This Project ensures the delivery of the Tribe's established entitlement of water (47,000 acre-feet/year) via the recently constructed S-409 pump station located at the L3/L4 pool known as Confusion Corner in the Big Cypress Seminole Indian Reservation. See *Appendix B* for map of the project.

Phase II of the Conceptual Plan, is designed to improve water quality, wetland restoration and water conveyance capacity in this basin by enhancing existing wetlands through re-hydration, transitioning existing poor quality uplands to functioning wetland habitat and establishing water detention cells as flood control. The completion date for Phase II is scheduled for September 2005.

The water detention cells will include Water Resource Areas (WRA), Irrigation Cells (IC) and Stormwater Attenuation Cells (SAC). Water Resource Areas are designed to hold 1 foot of water for 9 months, Irrigation Cells 3-4 feet of water for 6 months and Stormwater Attenuation Cells at 3 feet dependent upon rainfall. It is expected that the TP concentration removal within these systems will be dependent on the treatment area, depth

of water and retention times as estimated but will meet the 50 ppb phosphorus concentration as expressed in the US ACOE permit (199800622 IP-SS).

The largest of the Water Resource Areas, WRA 7 is designed at 3,257 acres for a corresponding storage volume of 3,257 acre-feet. Because this is located on the eastern side of the reservation, it falls within the L-28 Basin and should provide for a substantial reduction in total phosphorus loads into the L-28 Borrow Canal.

The Miccosukee Water Management Plan (MWMA) is a Critical Project to construct a managed wetland on the Miccosukee Tribe's 76,800 acre Alligator Alley Reservation located in western Broward County. This Project is designed to provide water storage capacity and water quality enhancement for waters which discharge into the Everglades Protection Area (WCA-3A). The project will convert approximately 900 acres of tribally owned cattle pastures into wetland retention/detention prior to discharge to the S-140 pump, adjacent to WCA-3A. The MWMA was sized to treat the nutrient inputs of the Miccosukee Tribal lands only. The storage area for this project is expected to be 3,600 acre-feet and the completion date for is 2010.

CERP PROJECTS IN L-28 BASIN:

Relocation and Enlargement of the S-140 (Component RR4): Relocating the S-140 approximately 8 miles south and increasing its capacity from 1000 cfs to 2000 cfs will result in improved hydro-pattern restoration to the northwest corner of the Water Conservation Area 3A (WCA-3A) and increased flows to the region. This increased flow, out of STA-3/4 and along the L-5 and L-4 canals via modified pump station G-404 will enter the northern reach of the WCA-3A. From the WCA-3A, sheetflow is expected to move between the Miami and L-28 canals and finally through the S-140 structure. The Initial Draft Plan details 285,000 acre-feet/year greater water discharges into WCA-3A and the ENP above the 2050 Base condition.

Historic flow and water quality data from the S-140 pump station were compiled to generate the Baseline data set (DBKEY 06754). The simulated baseline flow and phosphorus data for this structure for the 31-year period (1965-1995) are presented in *Figure 2.*

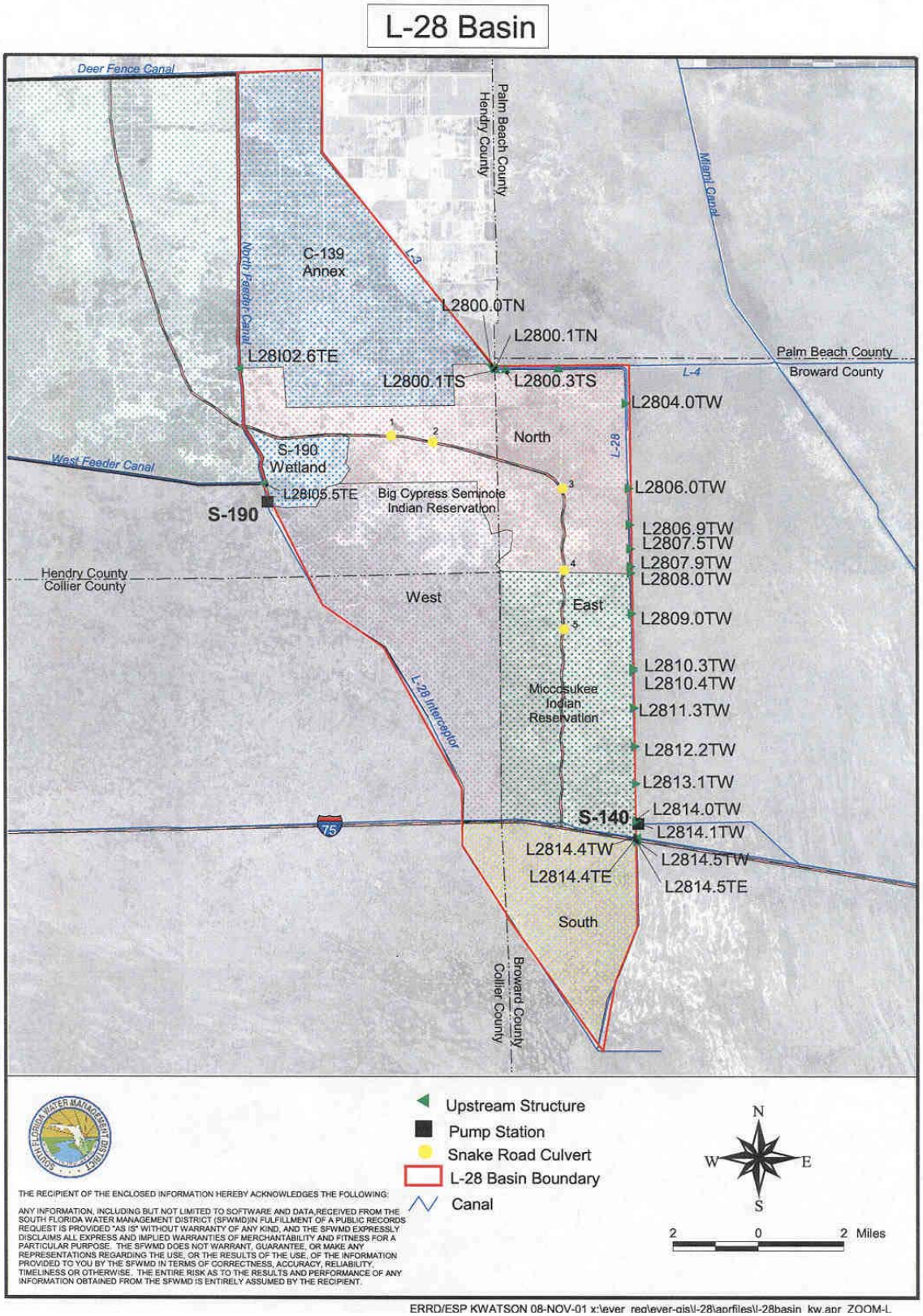
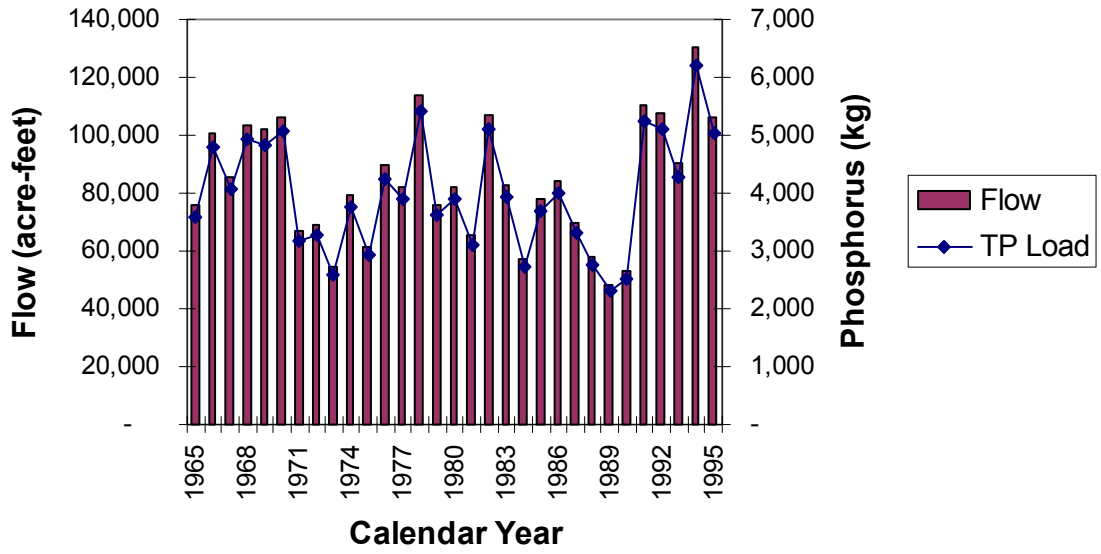


Figure 1. L-28 Basin

Figure 2. Simulated Baseline Flows and Phosphorus Loads - L-28 Basin



*Note: Baseline Flows and Phosphorus Loads shown in *Figure 2* are comprised of simulated flows from the South Florida Water Management Model (SFWMM) and observed water quality data from the ten-year period WY 90-99. To develop the baseline flows, the SFWMM was used to simulate current operational conditions and utilized rainfall for the 31-year period between January 1, 1965 and December 31, 1995. The goal was not to recreate the 31-year period of record flows, but rather, to simulate the expected hydrologic response in the basin as a result of the 31-year rainfall history. The flow-weighted average annual phosphorus concentration of 39 ppb was selected for use in the combined baseline data set. Reference: *Baseline Data for the Basin-Specific Feasibility Studies to Achieve the Long-term Water Quality Goals for the Everglades, SFWMD, May 2001.*

The summary of the 31-year period of simulated Baseline data at S-140 yields mean simulated flows of 83,806 acre-feet and TP loads of 3.98 metric tons. The flow-weighted mean TP concentration is 39 ppb.

ALTERNATIVES FOR L-28 BASIN

Alternative combinations of source control and STAs for the L-28 Basin are presented below. Major components of the alternatives, along with probable influences on the flows and water quality of discharges to Water Conservation Area 3A, are briefly described.

It should be noted that the alternative combinations below assume implementation of source controls (Agricultural Best Management Practices (BMPs)) by December 2006. It is assumed that all alternatives will maintain existing levels of flood protection within the basin.

Alternative 1

- Source Control Component: Agricultural BMPs and applicable Permit Enforcement by December 2006.
- STA Component by December 2006.

Alternative 2

- Source Control Component: Agricultural BMPs and applicable Permit Enforcement by December 2006.

Note: Separable costs will be provided for previously purchased land(s) which are to be incorporated in alternatives.

Alternative 1- Implement Source Control Component by 2006 and STA Component by 2006.

Description:

A. Source Control: It is assumed that agricultural stormwater BMPs, as defined by the Everglades Stormwater Program (or on Indian Lands under the authority of the EPA) along with enforcement of any applicable permit conditions will be implemented in the L-28 Basin by 2006.

B. STA Component: This alternative involves construction of an STA in the L-28 Basin to treat stormwater flows prior to discharge to the WCA-3A for the period December 2006 through 2056. The STA will be designed to reduce TP to the lowest sustainable concentration using the optimal combination of emergent, submerged aquatic vegetation (SAV), and PSTA.

Influence on Flow:

A. Source Control: It is assumed that there will be no reduction in the Baseline flows associated with source controls.

B. STA Component: It is assumed that there will be no reduction in the Baseline flows associated with this component.

Influence on Water Quality:

A. Source Control: The Baseline loads for the L-28 Basin will be used for the full evaluation of this alternative. As part of a sensitivity analysis, the phosphorus loads associated with discharges from the L-28 Basin (from the Baseline data set) will be reduced by 25%. The influence that this reduction has on the size of the proposed STA Component will be calculated and summarized. An additional 50-year present worth cost estimate will be developed for this reduced load case.

B. STA Component: It is assumed the treatment of stormwater discharge in an STA will result in a reduction in total loads of phosphorus to WCA-3A by December 2006.

Costs:

A. Source Control: There will be no cost estimates developed for this component.

B. STA Component: Land acquisition, levees, structures, borrow canals, limerock, and additional O & M costs, etc., will be required in order to implement this alternative.

Note: Separable costs will be provided for previously purchased land(s) which are to be incorporated in alternatives.

Alternative 2 – Implement Source Control Component by 2006.

Description:

A. Source Control: It is assumed that agricultural stormwater BMPs, as defined by the Everglades Stormwater Program (or on Indian Lands under the authority of the EPA) along with enforcement of any applicable permit conditions will be implemented in the L-28 Basin by 2006.

Influence on Flow:

A. Source Control: It is assumed that there will be no reduction in the Baseline flows associated with source controls.

Influence on Water Quality:

A. Source Control: As part of a sensitivity analysis, the phosphorus loads associated with discharges from the L-28 Basin (from the Baseline data set) will be reduced 25%. The influence that this reduction has on the phosphorus loads to the EPA will be calculated and summarized.

Costs:

A. Source Control: There will be no cost estimates developed for this component.

APPENDIX A

BACK UP, CALCULATIONS, AND ASSUMPTIONS

ADDITIONAL BACKGROUND INFORMATION

Basin-wide Source Controls. Source controls will require the implementation of a comprehensive and basin-wide pollution prevention plan. The plan must include regulation promulgation, hiring and equipping maintenance personnel, infrastructure improvements, and hiring compliance and enforcement staff. These basin-wide source controls will consist of Agricultural BMPs and Regulatory Programs as applicable to the landholders.

Agricultural Best Management Practices are stormwater management practices for agricultural areas. Examples include flow diversion, detention and/or retention, farming practices such as cover crops, buffer strips, etc., animal discharge controls, canal maintenance control and preventative maintenance programs.

Regulatory Programs (Permits and Permit Modifications) are developed to improve water quality, including identifying structures or systems requiring permits or modifications to permits. Regulatory programs may include any combination of voluntary BMPs, requirement and/or modification of permits, construction projects and basin-specific regulatory programs to achieve compliance with state water quality standards.

SUPPLEMENTAL DOCUMENTS

- L-28 Basin Water Quality Grab Sampling Survey, 1/28/98. Everglades Regulation Division, Regulation Dept., South Florida Water Management District. Steve Senates, Basin Manager.

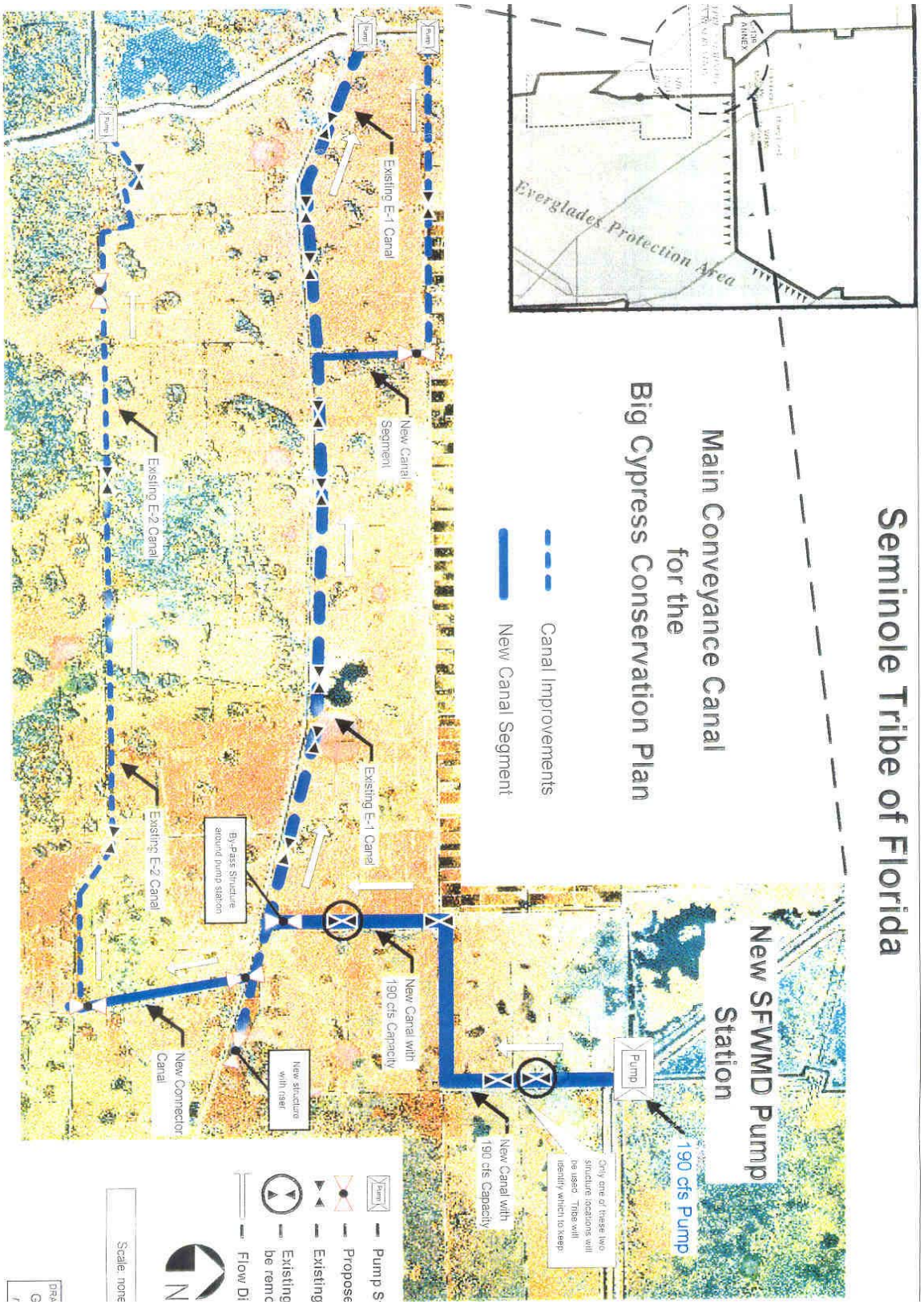
- USACOE Permit No: 199800622 (IP-SS). U.S. Army Engineer District, Jacksonville, FL. Permittee: Seminole Tribe of Florida.

- Seminole Tribe Everglades Restoration Initiative: Water Conservation System, Conceptual Plan. Briefing Paper to the U.S. Dept. of Interior. 2/17/95.

- Seminole Tribe of Florida: Conceptual Water Conservation System Design. Prepared by AMS Engineering and Environmental. 2/6/95.

- South Florida Water Management District Permit #26-00623-P: McDaniel Ranch.

APPENDIX B


Seminole Tribe of Florida
Main Conveyance Canal
for the
Big Cypress Conservation Plan
Canal Improvements
New Canal Segment
Everglades Protection Area
New SFWMD Pump Station
190 cfs Pump
Pump
Only one of these two structure locations will be used. Tribe will identify which to keep.
New Canal with 190 cfs Capacity
Existing E-1 Canal
New Canal Segment
Existing E-2 Canal
By-Pass Structure around pump station
New Canal with 190 cfs Capacity
New structure with riser
New Connector Canal
Existing E-2 Canal
Existing E-1 Canal
Pump S
Propose
Existing
Existing
be remo
Flow Di
Scale: none